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HANDBOOK

OF THE

6-INCH Q.F. GUN.

LAND SERVICE.



1898.



LONDON:

PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON AND SONS, ST. MARTIN'S LANE,
PRINTERS IN ORDINARY TO HER MAJESTY.

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NOTE.—This Handbook is correct up to May, 1898. Any alterations which may be suggested should be forwarded to the Chief Inspector, Royal Arsenal Woolwich.

AM.

ORDNANCE, Q.F., 6-INCH B., MARK II.

GUN.

(Plate I.)

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Material	steel (wire construction).	
Weight	{	of gun without fittings	...	6 tons, 7 cwt. 3 qrs.	
		of breech fittings	...	4 cwt. 3 lb.	
Length,	total	...	...	249.25 inches=41.54 cals
Bore	{	calibre...	...	6 inches.	
		length (to face of breech screw)	...	240 inches.	
		system...	...	Polygroove, hook section.	
		length	...	214.7-inches.	
Rifling Mark I.	{	twist	...	Increasing from 1 turn in 60 calibres at breech end of rifling to 1 turn in 30 calibres at muzzle.	
		grooves {	number	...	24
			depth05
			width6
		system...	...	Polygroove, modified plain section.	
		length	...	214.7 inches.	
*Rifling Mark II.	{	twist	...	Straight from breech end of rifling to 178.7 inches from the muzzle, then increasing from 0 to 1 turn in 30 calibres at muzzle.	
		grooves {	number	...	24
			depth05 inch.
			width39 "

The gun is without trunnions and is made entirely of steel. It consists principally of an A, 1B, and 2B tubes, B hoop, jacket, breech bush and breech ring, and a number of lengths of flat steel wire wound round the 1B tube.

Over the A tube is shrunk the 1B tube, which is secured longitudinally by corresponding shoulders, and a screwed steel breech bush at the rear; the bush is also prepared for the reception of the breech screw. Round the 1B tube are wound successive layers of flat steel wire, the ends of which are secured to steel rings provided for that purpose. The B hoop and 2B tube are shrunk round the A tube in front of the 1B tube extending to the muzzle, the B hoop overlapping portions of the wire and 1B tube. The jacket is fitted over the wire, B hoop, and a portion of the 2B tube, and is secured

* For guns of future manufacture, also when "through lined," or re-tubed.
(1495)

longitudinally by corresponding shoulders on the B hoop and 2B tube, and by the breech ring, which is shrunk round a portion of the breech bush and screwed to the jacket at the rear.

The breech ring is furnished with a lug on the under side for the attachment of the gun to the hydraulic buffer of the mounting.

Projections are formed on the upper side of the breech ring for the attachment of the gun to naval mountings, but these will not be used when the gun is mounted on land service mountings.

The exterior of the jacket is furnished with longitudinal projections, forming guides for the gun when in the cradle of the mounting.

The chamber is slightly coned so as to facilitate the insertion and extraction of the cartridge.

A plane for a clinometer is formed on the upper side of the gun immediately in front of the guide.

BREECH MECHANISM.

(Plate II.)

The breech is closed by a steel screw tapering at the front portion, to admit of its being swung into the loading position, the remaining portion being parallel.

The parallel and conical parts of the breech screw have three portions of the thread removed longitudinally, the divisions in relief on the conical portion being placed opposite the plain portions of the parallel part, for the purpose of distributing the strain. The breech opening of the gun being prepared in a corresponding manner admits of the screw, when the raised portions are placed opposite the smooth surfaces in the gun, being swung home and locked by the sixth of a turn.

The breech screw is supported, when withdrawn from the gun, by a bronze carrier, hinged to the right side of the breech ring, a projecting arm of which enters an axial recess in the screw. The screw is retained on the carrier, by means of a fixing screw, the inner end of which engages with a recess in the carrier, so arranged as to admit of the screw being turned circumferentially in opening or closing the breech.

Hinged to the carrier is a breech mechanism lever, which is connected by a link to a sliding block in the carrier. The block is furnished with a bronze bush, which engages with a stud in the outer face of the breech screw, so arranged that when the breech mechanism lever is pulled to the right, the first movement of the lever unlocks the breech screw, and on continuing the motion, the screw and carrier are swung into the loading position.

A catch, fitted to the carrier, engages with a corresponding recess in the outer face of the breech screw, when the breech is open, and retains the screw in the unlocked position. The catch is automatically disengaged from the screw in closing the breech.

EXTRACTOR.

The extractor consists of a steel bolt (projecting through the side of the gun into the chamber at the rear) having a shoulder near the inner end to accommodate the head of the cartridge. The bolt is

retained in position by means of a nut screwed into the exterior of the gun on the right side, the end of the hole on the left side (to facilitate the removal of the bolt) being closed with a screwed plug. The bolt is worked automatically by a lever fitted to its outer end, and an actuating bolt with spiral spring and cover, which engages with an eccentric formed on the hinge of the carrier in such a manner that when the screw is swung into the loading position, the bolt is partially revolved, thereby releasing the cartridge. The extractor bolt is returned into the loading position by means of the spiral spring on the actuating bolt, while the breech is being closed.

SHOT GUIDE.

A bronze shot guide, to facilitate loading, is hinged by a bolt to the right side of the breech, and is automatically raised to the loading position by means of an inclined plane, on the under side of the carrier, when the breech is opened. A stop screw provided on the under side of the breech opening engages with a groove on the inner side of the guide, and serves to support it laterally.

FIRING MECHANISM.

The firing mechanism is so arranged as to prevent the gun being fired before the breech screw is locked in the gun and the breech mechanism lever home.

A striker, for firing the gun by means of an electric current, or by percussion, is fitted through the projecting arm of the carrier, and retained in position by means of a steel nut furnished with a trigger. The retaining nut is provided on the exterior with interrupted thrust collars. The interior of the carrier being prepared in a similar manner, admits of the striker being placed in the carrier and locked by one-fourth of a turn of the nut to the right or left, thus rendering the trigger reversible, and admitting of the gun being fired from either side. The striker, which is actuated by a mainspring, is furnished with an insulated steel needle, one end of which projects through the firing hole of the breech screw, and makes contact with the primer of the cartridge. The outer end of the needle is connected by means of a contact and insulated cable with a contact on the mounting.

For the purposes of percussion firing, the striker is furnished with a cocking-handle, by means of which it is pulled into the cocked position, and retained by the trigger, which engages with a cock-notch on the outer sheath of the striker. The cocking-handle also serves as a wrench for dismantling the striker.

A safety stop is provided on the carrier to prevent the gun being fired before the screw is locked, and the breech mechanism lever home. It consists of a spindle, in two parts, with fixing screw. The upper part is provided with a projection, which engages with a lug on the striker, and so prevents contact being made by the needle with the primer in the cartridge. The lower part is furnished with a turning lever, which engages with a cam groove on the breech mechanism lever, in such a manner that

In closing the breech the spindle is partially revolved, and the projection on the upper part released from the lug of the striker, leaving the latter free to make contact with the primer of the cartridge.

A flat spring fitted to the underside of the carrier engages with a corresponding recess in the breech mechanism lever, and prevents any movement of the latter during firing.

CARE AND PRESERVATION OF GUN AND FITTINGS.

The guns should be examined after firing every 100 rounds.

For purposes of computation, four rounds of blank charges should be considered equal to one round with projectile, but in recording the rounds on the memorandum of examination, blank rounds should be shown as such. Only one-fourth of the total number of blank rounds fired will be carried forward to the column headed "Total number of rounds for examination purposes."

The bores of guns, from which practice is carried on, should be kept slightly oiled to prevent rusting. At the close of each day's practice, they should accordingly be washed and slightly depressed, and when dry, oiled by means of a piece of canvas placed over the piassaba brush, the muzzles being then closed with tampons.

The exterior of the guns is painted, with the exception of the working surfaces. The clinometer plane is not to be painted, and should never be cleaned by filing or by the use of brickdust, &c. To clean it, use a soft rag and afterwards oil it lightly.

When guns are not likely to be used for some length of time, the sights and breech fittings should be removed and kept in store, the small holes in the guns being filled with plugs of greased tow, and the breech opening with a wood plug, to keep out water and dirt. These plugs can be readily removed when it is required to fit the sights, &c., to the guns.

The sights and breech fittings should be kept clean, free from grit, and oiled.

The exposed portions of the sights are bronzed if made of bronze, and blued if of steel. This is done to preserve them from corrosion, and on no account are these parts to be burnished or cleaned in such a manner as to remove the bronzing or bluing.

All fittings of the gun should be treated with care; violence and jerks should be avoided, and no unnecessary force should be employed. All working surfaces must be well lubricated, the fittings being taken off sometimes for this purpose, especially after firing.

The breech fittings should work easily, and be free from cracks and burrs; the latter can be removed by filing, but this must be done carefully so as not to permanently damage the fitting. Should a crack be observed in a breech fitting, such fitting should be exchanged.

The following is a list of the oil-holes in the gun and fittings, which require to have the screws occasionally removed, and oil poured into the channels, so as to lubricate the parts without removal of the fittings. Care must be taken to replace the screws immediately after oiling:—

Fitting to be lubricated.	Position of oil-hole.
Carrier, hinge bolt.	Top of hinge bolt.
" " joint.	Lower part of carrier on right side.
Lever, breech mechanism, axis pin.	Top of axis pin.
Link, sliding block.	Top of outer end of link.
Bush " "	Left side of carrier.
Breech screw. "	In parallel portion of breech screw.
Extractor, bolt.	In screw plug, left side of gun at breech.

TO REMOVE THE BREECH FITTINGS.

Before removing the fittings, the breech should be opened, the breech screw being swung into the loading position.

STRIKER.

Pull back the striker until the projection on it is clear of the recess in the retaining nut, turn the nut one-fourth of a turn to the right or left; the striker can then be withdrawn.

BREECH SCREW.

Unscrew the fixing screw in the breech screw and remove it; the breech screw can then be withdrawn from the carrier.

SAFETY STOP.

Unscrew the fixing screw from the upper side of the stop, and remove the upper portion; the lower part can be withdrawn from below.

CATCH, RETAINING, BREECH SCREW.

Take out the four fixing screws, and remove the bracket with catch. Unscrew the guide screw clear of the catch; the latter, with spiral spring, can then be removed from the bracket.

SLIDING BLOCK WITH BUSH.

Take out the fixing screw of the axis pin of the "link sliding block," and remove the axis pin; the sliding block and bush can then be withdrawn from the carrier.

LINK, SLIDING BLOCK.

Remove the keep pin and nut of the link from the under side of the breech mechanism lever; the link can then be withdrawn.

LEVER, BREECH MECHANISM.

Remove the keep pin and nut from the axis pin; the lever can then be withdrawn.

SPRING RETAINING BREECH MECHANISM LEVER.

Take out the three fixing screws and remove the spring.

SHOT GUIDE.

Withdraw the keep pin of the hinge bolt, and remove the bolt and washer; the shot guide can then be withdrawn. The stop screw can be unscrewed and withdrawn, but this should only be taken out when absolutely necessary.

CARRIER.

Withdraw the keep pin, and remove the hinge bolt; the carrier can then be withdrawn.

EXTRACTOR.

Withdraw the keep pin of the axis pin of the actuating bolt, and remove the axis pin with washer. Turn the actuating lever to the right, remove the keep pin, and withdraw the lever from the extractor bolt. Take out the retaining nut of the extractor bolt from the right side of the gun, and the screw plug from the left side; the extractor bolt can then be removed by inserting a drift in the hole on the left side of the gun, and giving it a light blow with a hammer. Take out the fixing screws of the cover; the latter, with actuating bolt and spiral spring, can then be withdrawn.

TO DISMANTLE THE STRIKER.

To Remove the Trigger.

Press down the projecting portion of the spring clear of the recesses in the cap, and unscrew the cap; the trigger can be then withdrawn from the striker.

To Remove the Main Spring.

Remove the trigger as described above. Take off the cocking-handle, and, using it as a tommy, unscrew the assembling nut; the latter, with its washer, can then be removed. Take off the steel head and retaining nut; the main spring can then be withdrawn.

To Remove the Needle.

Take off the cocking-handle, and, using it as a wrench, unscrew the nuts of the needle; the nuts and leather washer can then be removed. The needle, with leather washer, can then be withdrawn from the sheath.

To Replace Fittings.

The fittings are replaced in the reverse order.

EXAMINATION OF Q.F. FITTINGS.

All removable fittings should occasionally be taken entirely apart, and examined, in order to ascertain that they are quite sound, and in good working order, any in which a crack is observed should be exchanged. The electric and percussion striker should be tested

to see that the insulation is not defective. All springs should be examined to see that they are serviceable. The inner end of the extractor bolt should be examined to see that the shoulder for the reception of the head of the cartridge is in good condition. In the event of the hole in the firing bush in the inner end of the breech screw becoming enlarged by erosion, the bush should be removed and replaced by the spare one.

MEMORANDUM OF EXAMINATION.

Every gun issued from the Royal Arsenal is accompanied by a "Memorandum of Examination," which is known by that name, and does not bear an Army Form number. It contains a short description of the construction and rifling, with a drawing of the gun, showing principal dimensions, also on the first page are given the particulars of any slight original defect or tool mark which may have existed at the date of issue.

On the inside sheet are recorded in detail, the nature and number of rounds fired, with the dates and results of the periodical examinations of the gun. This Memorandum will remain in charge of the officer who has possession of the gun, and a certificate to the effect that it is in possession and complete up to date, will be included in the Annual Return of Rifled Ordnance, Army Form G 925.

At the conclusion of each day's practice with the gun, an entry will be made in the Memorandum by the officer in charge, giving a detail of the rounds fired (including blank charges), so that an accurate record of the firing may always be kept up. The result of the examination of the gun will be added to the Memorandum by the Inspecting Officer, or Examiner, who performs the duty, and when the gun is returned into, or issued from store, the Memorandum will accompany the transfer vouchers. If at any time the Memorandum be lost, or damaged, a duplicate can be obtained from the Chief Inspector, Woolwich, by whom, also, inside sheets for continuation of the records of the number of rounds fired will be supplied on demand.

CARRIAGE, GARRISON, Q.F. 6-INCH (MARK I).

(Plates III, IV, and V.)

The carriage is constructed to allow 20 degrees elevation and 10 degrees depression, and to revolve about a central pivot on ball bearings.

The gun recoils axially in a cradle which is fitted with a hydraulic buffer to limit the recoil to about 12 inches, and two sets of springs to return the gun to the firing position.

The carriage consists of the cradle *a*, under-carriage *b*, shield *c*, and pedestal *d*.

The cradle *a* is in one casting of steel, with trunnions to pivot it in the under-carriage *b*, cylinders on each side to take the running-out springs, and a shorter cylinder along the centre of the underside for the hydraulic buffer. The hydraulic buffer (Plate V) is closed with a gun-metal gland *r* which is packed with hydraulic packing and an L leather ring. The piston has an opening *s* cut in its edge, which, when the gun is recoiling, passes over a valve key *t* fixed along the cylinder. This key varies the opening for the flow of

the oil, and this is so regulated as to ensure an approximately constant pressure during recoil.

A controlling plunger *u* is fixed to the front end of the buffer cylinder so as to enter a hole bored up the piston rod, and by displacing the oil therein contained forms a hydraulic cushion, which gradually brings the gun to rest when returning to the firing position. The quantity of oil required for the buffer is about 10 quarts, part of which is contained in a tank formed at the right side of the cradle; this tank communicates with the rear of the buffer through a small hole, thus maintaining the full quantity of oil in the buffer. A small air-hole passes through the cradle into the front of the buffer, and is closed by means of a long air plug which has a coned seating.

The running-out springs (Plate V) have each a plate in front, connected by a rod *v* to the cross bar which is attached to the breech ring; these springs are compressed during recoil, and their expansion returns the gun to the firing position.

On the left side of the cradle is a projection to which is bolted a metal bracket for supporting the sighting gear, and a brass guard is fitted to the rear of the cradle for the protection of the number laying the gun.

The under-carriage *b* consists of a steel casting formed at the top with trunnion bearings to support the cradle, and fitted with metal bushes to fit over the pivot and revolve on the anti-friction balls. These balls run in grooves between hardened rings to prevent wear; the rings are fitted one on the top of the pivot, the other to the underside of a plate bolted to the under-carriage over the pivot. On the left side of the under-carriage is bolted a steel bracket, which supports the elevating and traversing gears, and on the right side is bolted a similar bracket which carries an alternative quick traversing gear, and sighting platform to which is attached the battery box for electric firing.

The elevating gear is actuated by the hand wheel *e*, which transmits motion through worm wheel gearing to the elevating arc *f*, fixed to the cradle. A frictional arrangement to allow a slight slip on the gear to reduce the liability to damage when firing, is fitted in the hollow of the worm wheel; it consists of alternate discs of steel and metal, respectively arranged to revolve with the spindle and worm wheel. These discs are pressed together by a nut, acting on a spring steel washer, the pressure being adjusted to produce sufficient friction to prevent the gun running down when at rest.

Traversing is effected by worm wheel gear actuated by the hand wheel *g*, the whole system being revolved by a pinion *h*, gearing into a circular rack *i*, fixed to a plate on the top of the pedestal. When it is required to work the alternative gear the worm wheel is thrown out of action by releasing a clamping arrangement contained in the hollow of the worm wheel. This arrangement consists of a series of steel and metal discs which are jammed together or released by turning the hand wheel *k*.

The alternative quick-traversing gear consists of a spur wheel and pinion gear, which is revolved by a hand wheel working vertically. This gear actuates a similar pinion to *h*, of the worm wheel gear, and engages with the same rack. The difference in speed for one revolution of the hand wheel is 5 to 1.

To ensure a safe arc of fire, the depression can be limited by a bolt and nut fixed to the front of the under-carriage, and the traversing by a stop fitted to the shield and pedestal. Both bolt and stop can be adjusted as found necessary to suit local requirements.

The elevating gear is supported in a metal bracket, which also forms a standard for the support of the elevation and traversing indicators, the pistol grip for electrical firing, and an adjustable and removable shoulder-piece.

The indicators are for recording the yards of range and degrees of traverse, and consists of two large aluminium drums *m*, with the yard scales and degrees engraved around their respective circumferences; the drums being placed close together and covered with one pointer *n* so that they can be readily seen and quickly read by the laying number.

The elevation indicator drum is revolved by a phosphor bronze driving band, each end of which is connected to the extremities of a quadrant *o*, the centre of which fits over a hexagonal projection on the left trunnion of the cradle. The band passes over the boss of the drum which is studded with small projections to fit into corresponding holes in the band to prevent the latter from slipping, and its tautness is ensured by small spiral springs *p* at the points of attachment with the quadrant. As the quadrant is at right angles with the axis of the cradle, the slightest movement of the latter is immediately transmitted to the drum, and the yards of range at once indicated.

The traversing indicator drum is also actuated by a phosphor bronze driving band, one end of which is fastened to a metal drum rigidly fixed to the top of the pivot, the other end being passed through a hole in the side of the under-carriage around a guide pulley *q*, and from thence to a spring barrel on the indicator drum to which it is attached. Inside the spring barrel is a stout spring which tends to revolve the drum in one direction, consequently the band is always kept taut, as the carriage, when traversing, winds or unwinds the band around the fixed drum on the pivot, and so turns the indicator drum.

The pistol grip is for electrical firing only. The electricity is conducted from the battery box to the underside of the pistol grip by a cable. A similar cable from the pistol grip is attached to a contact bracket on the cradle, and on the cross bar attached to the gun is another contact bracket, the plunger of which touches the face of the cradle contact bracket when the gun is in the firing position, the current being conducted from this junction to the gun by an armoured cable. Contact is made by pressing the trigger of the pistol grip, and this action forces down a metal spring on to the terminal of the cable from the battery box; as this spring is in contact with the cable running to the cradle contact, directly it touches the terminal the current is free to flow to the cartridge primer.

To facilitate working the gun, a shoulder-piece is provided and a sighting platform is fixed at *l*, on which the gun layer stands.

The shield is a steel plate, curved and covered to protect the top, front, and sides of the mounting. It is supported by curved stays bolted to the carriage.

The pedestal is of cast iron, formed at the top to take the pivot.

SIGHTING.

The sighting gear consists of a steel rocking bar pivoted in the centre to one end of a steel carrier.

To the rear end of the rocking bar is fitted a hind sight, having a cross-head, furnished with a screw deflection leaf, with a notch and sighting blade. The cross-head is provided with a deflection scale plate graduated to 2 degrees right and left. The sight bar, which

passes through a socket in the carrier, is curved, forming an arc, having as its centre the centre of the axis pin of the rocking bar. The front face of the bar is furnished with a rack, gearing with a pinion and hand-wheel fitted to the carrier. Fitted to the pinion spindle is a drum, to which is attached the yard scale graduated to 10,000 yards for a full charge, with a muzzle velocity of 2,200 feet secs. A reader is attached to the rear end of the carrier to indicate the range. A removable aluminium range strip, graduated to 20 degrees, is fitted to the rear face of the sight bar.

A flat spring, fitted to the interior of the socket for the sight bar in the carrier, serves to ensure the bar being rigid when in position.

The fore-sight consists of a steel acorn point and a sighting blade, and is secured to the front end of the rocking bar by two fixing screws.

The carrier, which supports the rocking-bar of the sight, is fitted to the mounting by means of two screwed bushes (one of which is eccentric and is used for adjusting the sight) and two securing screws.

WEIGHT.

					ewts.
Carriage with cradle ...	...	...	...	...	33 $\frac{3}{4}$
Shield ...	...	...	...	...	80 $\frac{1}{2}$
Pedestal ...	...	...	...	...	148 $\frac{1}{4}$
Total ...	...	...	...	...	263

CARE AND PRESERVATION OF CARRIAGE.

If the carriage is not frequently used the movable parts of the elevating and other gears will be removed and placed in store, where the bright parts of the ironwork will be coated with anti corrosive grease, to preserve them from rust.

These parts will be thoroughly cleaned and placed in position at least once in three months to see that they are in proper working order. All other gears should be worked once a week to ensure their being in a working condition.

If the paint is rubbed off any part of the carriage, the place should be patched over as soon as possible to prevent rust.

A thorough cleaning and lubricating of all standing working parts must take place once a month. In this cleaning all clotted grease must be removed where visible, by scraping, and the parts wiped with an oily rag. Where the carriage is much exposed and liable to accumulate dust or sand, it should not be left with much grease or oil upon it, but only sufficient to prevent rust, for which a very slight film will suffice. Care should always be taken, as far as possible, to exclude dust from the mounting when not in use.

Whenever and wherever fresh lubricant is applied, the old should first be wiped or scraped off, and the parts well worked to distribute the fresh lubricant before leaving them.

Before firing or drill, care should be taken that all nuts and screws are properly tightened up, that all working parts are in proper gear, and that all friction plates are accurately adjusted, and are not jammed.

If a nut or screw be removed, it should be slightly oiled before being replaced, and a few turns given to it by hand before using the

spanner, to prevent damage by the threads crossing. A burr on the threads of a screw will prevent it being screwed home; the burr can be easily removed by means of a file. A hammer should never be used to tighten up screws or nuts.

Particular attention will be observed when removing or adjusting any gear not to indent or damage the component parts by rough usage; a hammer should never be used unless with a piece of wood or brass to transmit the blow.

In lubricating, the lubricating holes will be cleaned out with a wire and filled with oil, care being taken to replace the small screws, the heads of which must be kept bright so as to be readily seen.

A list of the oil holes in the mounting, stating their position and how access is obtained to them, is to be hung up in each emplacement, and none must be neglected.

These lists can be obtained on demand.

After filling the oil holes, the parts should be worked backwards and forwards until the oil shows on the shafting, fresh applications of oil being made if necessary.

The teeth of all pinions and toothed wheels should be greased.

The hydraulic buffer should be carefully examined before firing or drill to see that the cylinder contains the requisite quantity of fluid marked on the inscription plate, that there is no leakage at the gland and that the piston rod is properly connected.

If the buffer leaks at the gland, and tightening up the latter does not stop the leak, the packing must be renewed.

The buffer will be kept filled and periodically examined.

The whole of the gear must be removed by Armament artificers periodically, and all parts cleaned, keys adjusted, bolts and nuts tightened, lubricating holes thoroughly cleaned, the trunnion holes greased, and all parts properly lubricated, and any slight defect made good before reassembling the parts.

Whenever any parts are found broken, defective or deficient, which cannot be renewed by the artificer, fresh parts should be demanded at once. Any damage occurring at drill or practice should be at once reported with a view to its being made good without delay.

In all correspondence and reports relating to these carriages, their marks and register numbers should be quoted.

AMMUNITION.

PROJECTILES.

Nature.	Diameter.		Length.	Bursting charge.		Weight filled and fuze.
	Body.	Band.		Nature.	Weight.	
	ins.	ins.	ins.		lb. oz.	lb.
Shell, common, pointed, Mark I.	5.96	6.115	22.5	P. powder	7 7	100
" " " " II.		6.32		F.G. "	1 3	
Shot, armour piercing, " I.	5.96	6.115	17.3	—	—	100
" " " " II.		6.32		—	—	
Shot, paper " IV.	5.75	6.15	28	—	—	120

COMMON POINTED SHELL.

(Plate VI.)

The Mark I shell is of cast steel. Near the base a groove is turned, five ridges project on the groove, and twelve axial chisel marks are cut across the ridges to prevent the driving band turning on the shell.

The driving band is made of copper, and is pressed into the groove round the shell.

The head of the shell is pointed and struck with a radius of two diameters. A hole is bored in the base and screwed nine threads per inch left hand to receive the fuze or plug, the bottom of the hole being recessed to receive the flange of fuze or plug.

The Mark II shell differs from the Mark I only in the form of the driving band, the lower portion of which is undercut and of increased diameter as shown at A (Plate VI).

ARMOUR PIERCING SHOT.

(Plate VII.)

The Mark I shot is of forged steel, externally resembling the common shell except in the length, which is 17.3 inches. It has a core in order that a burster may be inserted if required. If the burster is not used, the shot must be weighted up with small shot and saw-dust. The base is closed by a screw plug.

The Mark II is the same as the Mark I, with the exception of the driving band, which is of the same pattern as that described for the Mark II common pointed shell.

BAGS, BURSTER.

These bags are made of dowlas, with neck and shoulder of shalloon.

PLUG, BASE.

The base plug is made of gunmetal, and is of the same external shape as the fuze, but with a square keyhole in the head to take the "Wrench, base, plug." A lead disc is fitted under the flange, to make a watertight joint when the plug is screwed into the shell.

PAPER SHOT.

This shot is for use with guns which cannot fire service projectiles in time of peace. It consists of a pressed wood pulp cylinder painted black, and having a filling hole in the base, closed by a bung. A band is formed round the base to prevent its being rammed home too far. When required for use the shot is brought up to weight by being filled with a proportion of small shot and saw-dust.

DRILL SHELL.

This shell is made of wood, brought up to the weight of the service projectile by a lead core. It is fitted with a bolt which passes through the centre of the shell and is screwed to a gun-metal nut, which forms the point of the shell. The base is protected by a gun-metal plate and is recessed to receive the head of an extractor. Two copper bands are fitted to the shell to prevent injury to the rifling; the rear band is sufficiently large to prevent the shell being rammed too far.

INSTRUCTIONS FOR FILLING SHELL.

(See Magazine Regulations.)

FIXING PLUGS AND FUZES, AND SECURING FUZES.

When adapters, plugs or metal fuzes are screwed into shells they will be lubricated with a mixture composed of whiting, mineral jelly and castor oil. It is issued ready mixed in tin cylinders.

The mixture is to be applied to the threads of the fuze or plug adapter with a brush in sufficient quantity to cover them, care being taken that it does not extend over the bottom.

Projectiles fitted with plugs and kept in exposed situations, where the plugs are liable to become set fast by corrosion from the action of salt water or otherwise, should have their plugs unscrewed once at least every six months, and the threads cleaned and re-lubricated as above.

DISTINGUISHING MARKS.

Empty projectiles will be painted and marked as follows:—

Common shell	...	...	...	...	black all over.
Shot	...	...	...	...	black, with white tip.

In addition, all steel projectiles will have a white band below the tip; the letters "C.S." are stamped on the base of cast steel, and "F.S." on the base of forged steel shells. Filled shells will, in addition, be marked with a red band below the tip.

The following additional marking will be shown—

- (a) The word "fuzed" if the shell is fuzed.
- (b) The word "bag" if one has been used.
- (c) The monogram of the station except when filled by the Royal Artillery.
- (d) The date of filling.
- (e) A disc 1-inch in diameter, if shalloon primers have been inserted.
- (f) The letter "P," 1 inch long, if filled with P. and F.G.
- (g) If the shell is fuzed with a base fuze, the head of the fuze or the lead cap covering it to be painted red.

The size of the type (except the letter P) will be $\frac{3}{4}$ -inch.

The bands will be $\frac{1}{2}$ inch wide, the white band, denoting steel, being immediately below the tip, and the red one, denoting filled, half an inch lower, except on armour-piercing shot, where the white band is 1 inch below the white tip.

Projectiles which are to be used for practice only will be marked with a yellow band $\frac{1}{2}$ inch wide round the body.

Shells which have been emptied will be marked on the head with the letter E and the monogram of the station, in red paint, any other markings except the rings and tip being obliterated with black paint.

Armour-piercing shot, when weighted up to mean weight with small shot and saw-dust, have W stencilled on the head in white paint, and stamped on the base plug.

EXAMINATION OF FILLED SHELL.

The examination of filled shells will only be carried out by an Inspecting Ordnance Officer. (For details see "Regulations for Army Ordnance Services.")

STORAGE OF FILLED SHELLS.

Filled shells will, as a rule, be stored on their bases. In exceptional cases, however, where it is desirable to utilize existing accommodation, which will not admit of the shell being so stored, they should be piled as may be found most convenient, a board being placed for the bottom layer to rest upon just in front of the driving band, and each layer pointing in the opposite direction to the one below, to prevent injury to the driving bands.

All projectiles fitted with the driving band with gas check, will have tarred rope grommets placed one on each side of the gas check portion of the band to protect it. The grommets will not be removed under ordinary circumstances until the projectiles are required for the service of the gun. A mallet and driver will be used in removing them, care being taken that the band is not injured during the operation. When removed the grommets should be returned to store.

AUGMENTING STRIPS.

Augmenting strips are intended to be used with B.L., and Q.F. projectiles in cases when the rifling of the gun has, owing to erosion, become so worn that the gun ceases to properly rotate its projectiles. The strips are of copper, of even section throughout, and grooved on one side.

Method of Insertion.—The top cannellure in the driving band is to be undercut all round on both sides by means of a special chisel supplied for the purpose. The augmenting strip is then inserted in the cannellure, grooved side of strip inwards, and lightly hammered until the two tongues of metal formed by the groove on the inner side of the strip are dovetailed into the undercuts in the cannellure.*

If the gun is very much worn, and one strip is found insufficient to impart the proper rotation, a second may be inserted in lower cannellure, in addition.

FUZE, PERCUSSION, BASE, LARGE, No. 11.

(Plate VIII.)

The Mark I fuze consists of the following parts, viz.:—Body, needle pellet, centrifugal bolt, pressure plate with spindle and nut, screwed cap with donator and plug, phosphor-bronze spring, brass spring, lead washer, and 4 brass screws.

The body of the fuze is made of manganese bronze, screwed outside, 9 threads per inch (left hand), to fit the fuze hole of the shell, and having a hole bored through the side, as shown in the plate, to take a small brass spring which works against the centrifugal bolt; the hole is closed by a brass screw plug. The base of the fuze, which is recessed and undercut round the edge, is closed by the copper pressure plate, which is secured in position by being pressed into the undercut portion of the recess; the pressure plate carries a spindle which retains the centrifugal bolt in the needle pellet by engaging in a slot in the latter until the pressure plate is blown in.

The needle pellet is made of gunmetal and has a screwed recess on top for the needle plug, and a hole bored in it, at right angles to the axis to take the centrifugal bolt. The needle pellet is prevented

* Cannellures will, in future, be undercut during manufacture, and the shell will be then marked with a U on the driving band.

from working forward in flight by the phosphor-bronze spiral spring.

The plug, which forms a magazine, contains a compressed pellet of 27 grains of R.F.G.² powder, and is screwed into the cap.

The detonator is spun into a recess in the cap and communicates by six fire holes with the magazine.

The action of the fuze is as follows:—On discharge, the pressure plate is driven in, carrying the spindle with it, the head of the spindle, being forced down, releases the centrifugal bolt and leaves it free to move. The rotation of the shell causes the bolt to fly outwards, compressing the spring in rear, and leaving the needle pellet free to move forward. On impact, the needle pellet with the bolt moves forward, and compressing the spring, drives the needle into the detonator and fires it, the flash of discharge being communicated through the magazine to the bursting charge.

The Mark II fuze differs from the Mark I in having the cavity in the base for the pressure plate slightly altered and the shoulder under the pressure plate reduced so as to offer less resistance to the plate.

CARTRIDGE, Q.F. OR Q.F.C. 6-INCH, SHORT, 13LB. 4oz.
CORDITE SIZE 30, MARK VI.

(Plate IX.)

Empty.

The empty cartridge is made of solid drawn brass to the form shown in the plate. A hole is bored in the centre of the base, and screwed 14 threads per inch to receive the electric primer or the adapter. Three clips are formed at the mouth of the cartridge for retaining the lid in the cartridge, these clips being turned over the edge of the lid, and the joint sealed with cement.

Lid.

The lid is made of white metal. The cap of the lid is weakened by having three concentric and six radial grooves in its outer surface to ensure its breaking up in the gun; it has also three notches in the rim, and the centre is recessed for the reception of the label denoting the method of filling. The interior of the lid is filled with a lubricating mixture consisting of equal parts of beeswax and tallow, a metal cover .02-inch in thickness being placed over this mixture and soldered to the cap, resin being used as a flux.

Filled.

The filled cartridge contains a charge of 13 lb. 4 oz. of cordite size 30, the method of filling being denoted by the numeral.

The charge is made up as shown in the plate, with the object of avoiding waste in cordite. One end of the charge is enclosed in a shalloon bag which has a pocket at the bottom for the reception of a .2-inch cordite cylinder. The bag is secured to the charge by silk braid. An igniter of 1½oz. R.F.G.² powder in a shalloon bag is secured by silk twist to the inside of the cordite cylinder.

The cartridges are stencilled "cordite" on the lid, and are issued filled and fitted with electric primers, in boxes each of which holds four cartridges.

Filled cartridges will be stamped on the base with the letters "P" or "C" to denote that the cartridges are filled with either

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R

powder or cordite, and, in addition, with the letters "F" or "R" to denote that the charge is either a full or reduced one. When again filled, should the explosive used be the same as in the previous charge, it will only be necessary to add a small "F" or "R" to denote whether full or reduced. Should the explosive used be different to that in the previous charge, the letter "C" or "P" should be inserted before the small "F" or "R."

Empty cartridges must be cleaned immediately after firing. The fired cartridges should be immersed and well washed in clean fresh water, which should contain $\frac{1}{2}$ oz. of soda to the gallon. They should then be rubbed inside and out with a mop (formed by a piece of rag tied to the end of a stick), rinsed in clean water, and wiped perfectly dry. They will then be repacked in the boxes in which they were supplied, and returned to the Army Ordnance Department as soon as possible for relacquering and reforming, which should be done with the least possible delay, as cartridges when left unlacquered deteriorate rapidly.

The fired cartridges are on no account to be repacked in boxes containing unfired cartridges.

DRILL CARTRIDGE.

This consists of a wood block weighted with lead to the weight of the service cartridge formed to resemble the cartridge case and fitted at each end with a brass cap; these caps are connected by a through bolt, and further secured by brass screws. The rear cap is formed like the base of the service cartridge, and screwed for the reception of a dummy primer.

PRIMER, ELECTRIC, MARKS III AND IV.

(Plate X.)

The Mark III consists of the following parts:—Body, contact disc, ebonite insulator, cone, 3 poles, 2 platinum wire bridges, cylinder, mealed powder, brass washer, and cork plug.

The *body* is of manganese bronze. The head is milled and has two slots cut in it to fit the "keys, inserting and removing primers."

The body below the shoulder is screwed for a length of 0.8-inch to fit the cartridge. The end of the body is reduced in diameter for a length of 0.3-inch and screwed to receive the cylinder. The face of the body between the two screwed portions is cupped out for a depth of 0.25-inch to form a gas-check. The head is recessed in the centre to receive the insulator and contact disc.

The inside of the body is turned out to the form shown in the plate.

The *ebonite insulator* is inserted in the head in two parts, viz.:—a disc and a ring. It is held in position by the metal of the head being burred over.

The *contact disc* is of crown metal, and is placed between the two parts of the insulator.

The *cone* is of brass insulated with oiled silk. The contact disc is connected to the centre of the cone by a piece of insulated copper wire, which is inserted and soldered into the disc and cone, and coiled as shown in the plate.

The *poles* are of crown metal, the larger one fixed in the centre of the cone, the two smaller ones in the end of the body about 0.14 inch

apart. Two platinum wires are each soldered with pure tin to the end of the centre pole, then separately stretched across and soldered with pure tin, one wire to each pole in the body. The resistance offered by the double wires is from 0.6 to 0.9 ohm.

The *cylinder* is of brass, screwed inside at the top to fit over the end of the body, to which it is secured by a small set screw. It is recessed at the tapered end to take the brass washer and cork plug.

The *mealed powder* consists of two parts by weight of gun-cotton dust and three of mealed powder. The whole of the space round the centre pole and the inside of the cylinder is filled with it.

The primer is closed by a *brass washer* with a hole through the centre and a *cork plug*, the latter being secured with shellac cement and varnished with shellac varnish.

Mark IV differs from *Mark III* as follows:—

The *ebonite insulator* is cupped out, and the recess in the head of the *body* is slightly undercut to receive it.

The *contact disc* is of white metal, and is placed in the bottom of the *ebonite cup*, which is then filled up with white metal, well pressed, so as to expand the ebonite cup into the undercut recess.

The *cone* is secured in position in the body by an ebonite washer and brass collar.

A few strands of pure guncotton are placed in the powder charge, between the wires, to facilitate ignition.

Filled cartridges are issued with primers in them. Spare primers are packed 10 in a tin cylinder, 20 cylinders being packed in a wooden box with lid attached by screws.

ADAPTER.

The adapter is for use when the gun is fired by mechanical means. It is made of hardened steel, similar in external form to the service electric primer, with the interior shaped to take the ordinary vent-sealing percussion tubes, and it has a fire hole in the bottom. The *Mark II* is shorter than the *Mark I*.

DUMMY PRIMER.

The dummy primer is made of solid brass, to the same external shape as the service electric primer, with the exception of the head, which is octagonal. A disc of hard india rubber is secured in the head so as to ensure insulation on release of the striker. It is stamped "dummy" on the head, and is used for drill purposes.

KEYS, INSERTING AND REMOVING PRIMERS.

(Plate XI.)

These keys are made of mild steel to the form and dimensions shown on the Plate. They are used for inserting and removing the primers and adapters in the cartridge.

CARTRIDGE BOX.

The box is made of deal, with elm ends. The sides and ends are dovetailed together, and the bottom is secured by brass screws. An elm cleat is fitted to the top and bottom of each end, and two vertical

battens of deal are placed between the cleats to facilitate stowage. Each end of the box is fitted with a rope handle, which is attached to the top cleat.

The lid, which is zinc lined and fitted with two white-line handles, is secured by brass screws working in nuts let into the top of the box, and strengthened by two deal battens, each recessed to receive the end of the handles.

The box is fitted with an inside lining of zinc, and is made airtight by a luting joint formed in the lid. It will hold four cartridges, two base up and two base down; the mouths of the cartridges fitting into recesses, and the primers into holes in the packing pieces, so as to prevent movement during transport.

Dimensions, &c.

Length over all	...	18·725 in.
Width	"	17·125 "
Depth	"	19·65 "
Weight	...	54 lb.

TUBES.

TUBE, VENT-SEALING, PERCUSSION, MARK IV.

(*Plate XII.*)

The tube consists of a body, anvil, striker, washer, percussion cap, copper disc, two paper discs, and a cork plug.

The body is made of solid drawn brass. A hole is drilled through the head to receive the striker, which is secured in position by being riveted into the countersunk washer, as shown in the plate. The upper part of the chamber is screwed and fitted with an anvil, on which is placed the percussion cap, the upper surface of which is in contact with the striker. A small central and two diagonal holes are drilled through the anvil. The remainder of the space in the tube is filled with loose pistol powder, and the bottom is closed with a paper disc and cork plug coated with varnish.

On firing the gun the point of the striker of the percussion lock drives the striker of the tube, together with the percussion cap, on to the anvil, thus firing the tube.

TUBE, VENT-SEALING, PERCUSSION, DRILL.

(*Plate XII.*)

This tube is made of gun-metal, the interior being bored out, and the head fitted to receive the coned india-rubber plug as shown in the plate. The lower portion is closed by a gun-metal plug.

EXTRACTOR, CARTRIDGE, HAND, Q.F. OR Q.F.C. LARGE.

The extractor is made of steel, with a jaw at one end to grip the head of the electric primer when withdrawing the cartridge. The other end is flattened so as to fit under the forearm when the hand grasps the handle in the centre.

RANGE TABLE FOR 6-INCH Q.F. GUN

Charge, { weight, 13 lb. 4 oz.
 { gravimetric density $\frac{55.01}{0.504}$
 { nature, cordite, size 30/14
 Projectile, { nature, Palliser shot (Fuze scale, Shrapnel shell).
 { weight, 100 lb.
 Muzzle velocity, *2154 f.s. (M.V. when charge is fired about 60° Fah.)
 Jump—Nil.
 Nature of Mounting for which jump is calculated, Pedestal.

Range.	Elevation.	Angle of descent.	Slope of descent.	5 minutes' elevation will alter range by	Remaining velocity.	Approximate penetration wrought iron.	Time of flight.	Fuze scale for middle sensitive time fuze.	
								Range.	Fuze. set
yards.	° /	° /	1 in.	yards.	f.s.	inches.	seconds.		0
100	0 4	0 5	687	125	2120	13.4	0.16	59	1
200	0 9	0 9	381	125	2090	13.2	0.31	110	2
300	0 13	0 14	245	125	2060	13.0	0.47	161	3
400	0 17	0 18	190	125	2030	12.8	0.62	212	4
500	0 21	0 22	156	125	2000	12.6	0.78	268	5
600	0 26	0 27	127	125	1970	12.4	0.95	315	6
700	0 30	0 31	110	125	1940	12.2	1.11	366	7
800	0 34	0 35	98	125	1910	12.0	1.28	418	8
900	0 39	0 40	85	125	1880	11.8	1.44	463	9
1000	0 43	0 44	78	125	1854	11.6	1.61	519	10
1100	0 47	0 48	71	125	1828	11.4	1.78	569	11
1200	0 51	0 52	66	125	1800	11.2	1.95	620	12
1300	0 54	0 56	61	125	1775	11.0	2.12	669	13
1400	0 59	1 1	56	125	1749	10.8	2.30	718	14
1500	1 3	1 6	52	125	1720	10.6	2.47	765	15
1600	1 7	1 12	48	125	1695	10.5	2.65	812	16
1700	1 11	1 19	43	125	1670	10.3	2.84	859	17
1800	1 16	1 26	40	100	1645	10.1	3.03	906	18
1900	1 22	1 33	37	100	1620	9.9	3.23	952	19
2000	1 27	1 40	34	100	1592	9.7	3.41	998	20
2100	1 32	1 48	32	100	1568	9.5	3.60	1042	21
2200	1 37	1 56	30	100	1540	9.4	3.80	1087	22
2300	1 42	2 4	28	100	1520	9.3	4.00	1131	23
2400	1 47	2 13	26	100	1495	9.1	4.20	1176	24
2500	1 53	2 23	24	100	1470	9.0	4.40	1219	25
2600	1 58	2 32	23	100	1445	8.8	4.60	1262	26
2700	2 4	2 42	21	80	1425	8.6	4.80	1304	27
2800	2 11	2 52	20	80	1400	8.5	5.00	1346	28
2900	2 17	3 3	19	80	1380	8.4	5.22	1389	29
3000	2 24	3 14	18	80	1360	8.2	5.45	1430	30
3100	2 31	3 26	17	80	1335	8.1	5.67	1473	31
3200	2 39	3 38	16	80	1315	8.0	5.90	1516	32
3300	2 45	3 50	15	80	1295	7.8	6.12	1563	33
3400	2 52	4 2	14	70	1275	7.7	6.35	1611	34
3500	2 59	4 15	13	70	1255	7.6	6.57	1653	35
3600	3 6	4 28	13	70	1235	7.5	6.80	1694	36
3700	3 14	4 42	12	63	1215	7.4	7.04	1739	37
3800	3 23	4 58	12	63	1200	7.3	7.28	1782	38
3900	3 31	5 10	11	63	1185	7.2	7.53	1824	39
4000	3 39	5 25	10	63	1172	7.1	7.78	1866	40
4100	3 47	5 41	10	63	1160	7.0	8.03	1908	41
4200	3 56	5 57	9	63	1150	6.9	8.28	1950	42
4300	4 4	6 13	9	63	1140	6.8	8.55	1995	43
4400	4 13	6 30	9	63	1130	6.7	8.82	2040	44
4500	4 21	6 46	8	67	1115	6.6	9.09	2081	45
								2122	46
								2163	47
								2204	48
								2246	49
								2288	50
								2329	51

* The charge when fired at a temperature of 80° Fah. gives a M.V. = 2200 f.s.

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Range.	Elevation.	Angle of descent.	Slope of descent.	5 minutes' elevation will alter range by	Remaining velocity.	Approximate penetration wrought iron.	Time of flight.	Fuze scale for middle sensitive time fuze.	
								Range.	Fuze set.
yards.	°	°	1 in.	yards.	f.s.	inches.	seconds.		
4600	4 30	7 2	8	56	1100	6·6	9·36	2370	13
4700	4 33	7 19	8	55	1090	6·5	9·63	2411	13½
4800	4 47	7 36	7	64	1080	6·4	9·90	2452	13½
4900	4 56	7 53	7	63	1070	6·4	10·18	2491	13½
5000	5 5	8 10	7	62	1060	6·3	10·46	2530	14
5100	5 14	8 27	7	51	1050	6·3	10·74	2570	14½
5200	5 23	8 44	6	50	1040	6·2	11·02	2610	14½
5300	5 32	9 1	6	49	1030	6·1	11·31	2647	15
5400	5 41	9 18	6	48	1020	6·0	11·60	2684	15½
5500	5 50	9 36	6	47	1010	5·9	11·89	2728	15½
5600	6 0	9 54	6	46	1000	5·9	12·18	2802	16
5700	6 10	10 13	5	45	990	5·8	12·47	2836	16½
5800	6 20	10 32	5	43	980	5·8	12·76	2877	16½
5900	6 31	10 51	5	42	970	5·7	13·08	2918	16½
6000	6 42	11 10	5	41	960	5·6	13·39	2959	16½
6100	6 54	11 29	5	39	950	5·6	13·70	3000	17
6200	7 6	11 48	5	38	940	5·5	14·02	3035	17½
6300	7 18	12 10	5	37	930	5·5	14·35	3070	17½
6400	7 30	12 32	4	36	925	5·5	14·69	3104	17½
6500	7 43	12 55	4	36	920	5·4	15·03	3138	18
6600	7 56	13 18	4	35	915	5·3	15·38	3174	18½
6700	8 9	13 42	4	35	910	5·3	15·73	3210	18½
6800	8 23	14 6	4	34	900	5·3	16·08	3245	19
6900	8 47	14 32	4	34	893	5·2	16·44	3280	19½
7000	8 51	14 58	4	33	883	5·2	16·80	3317	19½
7100	9 5	15 25	4	33	878	5·1	17·16	3354	20
7200	9 20	15 52	3	33	870	5·1	17·52	3397	20½
7300	9 35	16 19	3	33	866	5·0	17·88	3440	20½
7400	9 50	16 46	3	33	862	5·0	18·25	3482	20½
7500	10 5	17 13	3	33	856	5·0	18·62	3524	21
7600	10 20	17 40	3	32	850	4·9	19·00	3568	21½
7700	10 35	18 8	3	32	845	4·9	19·37	3610	21½
7800	10 50	18 37	3	32	840	4·9	19·75	3652	21½
7900	11 6	19 6	3	32	835	4·8	20·12	3694	22
8000	11 21	19 36	3	32	830	4·8	20·50	3737	22½
8100	11 37	20 5	3	31	825	4·7	20·88	3780	22½
8200	11 52	20 34	3	31	820	4·7	21·26	3822	23
8300	12 7	21 3	3	30	815	4·7	21·64	3865	23½
8400	12 23	21 33	2	30	810	4·6	22·02	3908	23½
8500	12 38	22 3	2	30	805	4·6	22·40	3951	23½
8600	12 54	22 33	2	30	800	4·6	22·78	3994	24
8700	13 9	23 3	2	30	795	4·5	23·16	4037	24½
8800	13 25	23 33	2	29	790	4·5	23·55	4080	24½
8900	13 41	24 3							

DRILL FOR 6-INCH Q.F. GUNS.

PROVISIONAL.

Detachment.—The gun detachment consists of a gun captain and five other gun numbers.

Telling Off.—The detail for falling in and telling off is the same as laid down at page 246, "Garrison Artillery Drill," Vol. I, except that there is no gun layer.

GENERAL DUTIES.

General Duties.—The gun captain commands, and is responsible to the gun group commander for the regular and efficient service of the gun in all respects; he elevates, traverses, lays, and fires when electric firing is used. With percussion firing he gives the command to fire to No. 4.

No. 2 opens the breech, extracts cartridge case, closes the breech, and with electric firing gives "Ready" when clear of the recoil. He traverses when the alternative quick gear is required.

No. 3 rams home.

No. 4 brings up and places cartridges in the chamber. With percussion firing he inserts the percussion tube, cocks the striker, hooks the lanyard to the trigger, giving the word "Ready" when clear of the recoil, and fires on the command from the gun captain.

Nos. 5 and 6 alternately bring up a projectile and place it in the breech, and assist 3 to ram home.

AMMUNITION SUPPLY.

Cartridges.—Cartridges are supplied from the cartridge store to level of emplacement (4 feet 6 inches below gun platform) by a continuous hand lift. Closed recesses in the emplacement supply accommodation for 32 rounds in boxes. Half of these rounds should be kept prepared for percussion firing.

Projectiles.—Projectiles are supplied to level of the gun platform by a ladder lift which delivers at the rear of the platform.

Pits, with double-hinged covers on the gun platform, provide accommodation for 24 rounds: 6 projectiles in a pit.

An alternative method of supply for cartridges and projectiles together, from stores to level of emplacement, is afforded by a quick return lift.

Cartridge Numbers.—For supply of cartridges, two numbers will be required (in addition to those in the store and at the lift) in the emplacement. Their duties are to keep No. 4 supplied with cartridges, to remove empty cases and to prepare cartridges for percussion firing if required.

Projectile Numbers.—If the supply of projectiles be from the pits on gun platform or by the ladder lift, no extra numbers will be required in the gun emplacement: with supply by means of the quick return lift two numbers will be required in addition to those in the store and at the lift. Their duties are to carry projectiles by hand from the lift and place them on the gun platform ready for 5 and 6 to serve to the gun. With this nature of supply of ammunition, the cartridge and shell numbers should change rounds when relief is necessary for the numbers carrying projectiles.

TO PREPARE FOR ACTION AND EXAMINE GUN.

<i>Gun Group Commander.</i>	<i>Gun Captain.</i>
"— Group Prepare for Action and Examine Gun."	"— Prepare for Action." "— Examine gun."

Prepare for Action.—At "*Prepare for Action*" each number brings up his stores as under:—

Gun captain—Sights, spare strikers, and electric firing battery if not on the mounting.

No. 2. Cartridge extractor, and wrenches for breech mechanism and buffer.

No. 3. Rammer, McMahon spanner, oil can, and waste.

No. 4. Percussion tubes and lanyard. For drill, a drill cartridge.

Nos. 5 and 6. Assist 3. For drill, a drill shell.

The ammunition numbers will require the following stores:—

- 1 brush, for cleaning shell.
- 1 key, inserting, primers.
- 1 " removing "
- 1 " fuze, universal.
- 1 screwdriver.
- 1 grease pot.

The gun captain fixes the sights and attaches the firing battery to the mounting, if not already on.

2 places the cartridge extractor, and

3 places the rammer in convenient positions ready for use.

The other stores are placed clear of the working of the gun.

The ammunition supply numbers see that the reserve of ammunition in recesses and pits is complete, and arrange their stores handy for use.

Examine Gun.—The gun captain now gives "*Examine Gun*," and sees—

That the sights are properly attached to the mounting, and work easily, and that the automatic sight (if used) is in proper adjustment.

That the firing mechanism, both electric and percussion, is in proper order.

That the buffer is properly connected, not leaking at the gland, and contains the correct amount of oil, the capsquares properly secured, and that the trunnions of the cradle are locked.

That the elevating and traversing gear is oiled and in working order, and the recesses on the top of the cradle are filled with oil.

He receives reports, from the numbers responsible, of any irregularity or deficiencies in connection with the different parts of the gun, mounting, or stores.

2 opens the breech; he takes the handle of the breech mechanism lever in his right hand, and pulls it towards him as far as it will go, which unlocks and withdraws the breech screw. He then examines the breech screw and the threads of the breech, and sees that they are clean and free from burrs, and lubricates the threads with a slight film of oil.

The gun captain looks through and sees that the bore is clear.

4 loads an empty cartridge, fitted with an electric primer.

2 then closes the breech by taking hold of the lever with his left hand, and pushing it away from him as far as it will go.

The gun captain tests the electric firing circuit by firing the primer.

2 opens the breech, extracts the cartridge case, and closes it again.

After each number has completed his work, he takes post as follows:—

Gun captain. On the sighting step.

No. 2. On the right of the gun facing the breech.

No. 3. On the left of the gun facing the breech.

No. 4. On the right of No. 3.

Nos. 5 and 6. At the head of the ladder lift or at the pit from which projectiles are to be taken.

TO LOAD.

<i>Gun Group Commander.</i>	|	<i>Gun Captain.</i>
" — <i>Group.</i>"	|	" — <i>Gun.</i> "
" — <i>Load.</i>"	|	" — <i>Load.</i> "

To Load.—

2 opens the breech (and extracts the empty cartridge and lays it down, using the extractor with his left hand).

5 (or 6) supplies himself with a projectile and places it in the breech in a convenient position for ramming home, and assists 3 to ram home; 6 (or 5) gets another projectile.

3 supplies himself with the rammer, and assisted by 5 (or 6) rams home the projectile and replaces the rammer.

4 receives a cartridge from the ammunition supply number, or supplies himself with one from those placed ready to his hand, places it in the chamber and then gets another cartridge. If percussion firing is used, he inserts the percussion tube, cocks the striker as soon as the breech is closed, hooks the lanyard to the trigger and giving the word "Ready" as soon as clear of the recoil, awaits the word to fire from the gun captain. After firing he unhooks the lanyard and gets another cartridge.

2 closes the breech as soon as the cartridge is in, and with electric firing gives the word "Ready" when clear of the recoil.

Loading with Percussion Firing.—With percussion, which is only used after the failure of all electrical arrangements, 4 will enter the cartridge (with adapter) into the chamber, and 2 will close the breech; when by this means it is ascertained that the charge is properly home, 2 opens the breech with care so as not to work the extractor, and 4 inserts the percussion tube; 2 then closes the breech carefully to avoid jamming the tube, which might cause it to explode.

TO FIRE.

<i>Gun Group Commander.</i>	
" — <i>Yards.</i> "	" <i>Slow Fire.</i> "
" — <i>Minutes.</i> "	" — <i>Gun.</i> " " <i>Shot</i> "
(<i>R. or L.</i>)	
or	
" — <i>Yards.</i> "	" <i>Rapid Fire.</i> "
" — <i>Minutes.</i> "	

The gun captain adjusts the sights (if not automatic) to the elevation and deflection ordered by the gun group commander.

He lays his gun on the target and keeps it on, giving elevation and direction by means of the hand wheels, and waits for the order to fire.

When quick traversing is required, the alternative gear is worked by 2, the slow gear being thrown out by the gun captain by means of the clamping wheel.

Fire Discipline without Range Instruments.—With ordinary sights, and no range-finding instruments, the above will be words of command from the gun group commander. With automatic sights, the orders regarding range are not required.

Slow Fire.—"Slow Fire" is only a caution, being followed by "— Gun." "Shot" when the gun group commander wishes a gun of his group to fire a round. This order of fire is to be used for ranging purposes or when great rapidity of fire is not desirable.

Rapid Fire.—"Rapid Fire" is an order to commence firing, and the fire is to be continued until stopped by "Stand Fast" or "Cease Firing."

Use of Whistle.—The gun group commander will use a whistle with the following significations:—

One blast—"Stand Fast."

Two blasts—"Cease Firing."

"Stand Fast" is only a momentary cessation of fire to enable orders to be heard. With this exception the service of the guns is to proceed as usual, and gun captains are to follow their target. Fire is to be continued immediately orders have been received and acted on.

Electric Firing, the rule.—Percussion firing will only be used as an alternative in case of failure of the electric firing mechanism.

Electric Firing.—With electric firing, the gun captain, after 2 has given the word "Ready," and his gun is properly layed, will fire by pressing the trigger. With "Slow Fire," he fires on the command from the gun group commander. With "Rapid Fire," he fires, at his own discretion, and continues his fire until "Stand Fast" or "Cease Firing" is ordered, or until he has fired the number of rounds ordered.

Guns to be kept on target.—At both orders of fire, all gun captains of the group will keep their guns laid on the target.

Percussion Firing.—With percussion firing as above, except that the gun captain gives the word "— gun," "Fire" after 4 has given the word "Ready" and the gun is fired by 4.

Reloading.—After firing the gun is immediately reloaded without word of command.

Fire Discipline with Range-Finding Instruments.—When range-finding instruments are used, the fire discipline will be as laid down, for 6-inch B.L. guns, in "Garrison Artillery Drill," Vol. I.

MISS-FIRES.

Electric Firing.—With electric firing the gun captain should press the trigger again; if the gun does not fire, after the pause of a minute, 2 will open the breech and extract the cartridge, 4 loading a fresh one; 2 closes the breech. Should a miss-fire again occur with the new cartridge, the fault is probably in the firing battery or mechanism; percussion firing should be resorted to, and the electric mechanism examined and put right when time permits.

Percussion Firing.—With percussion firing, 4 will re-cock the striker by means of the cross handle, and will again pull the

lanyard on the command to fire from the gun captain; should the gun again miss-fire, 2, after a pause of one minute, opens the breech very gently. The gun captain will examine the tube, and if it has been struck, the cartridge will be carefully extracted and placed well clear of the group. It will be destroyed as soon as possible by being thrown into deep water. If the tube has not been struck, the gun captain will change the striker.

CEASE FIRING.

No. 2 opens the breech.

With percussion firing 4 unhooks the lanyard, 2 opens the breech. 4 then releases the striker.

CEASE FIRING AND REPLACE STORES.

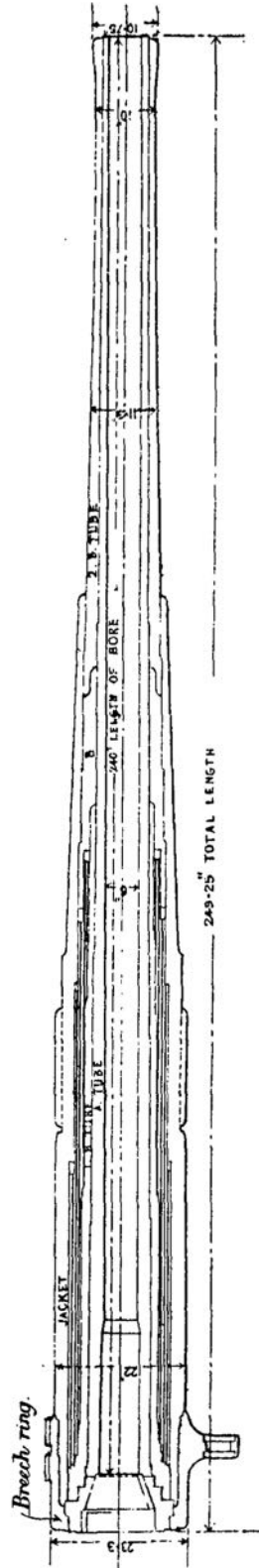
The gun captain sees that the gun is depressed to about 4° . The stores are replaced by the numbers who brought them up. After replacing stores the detachment falls in two deep at the rear of the emplacement.

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ORDNANCE, Q. F. 6 INCH. MARK II.

STEEL (WIRE CONSTRUCTION) 7 TON.

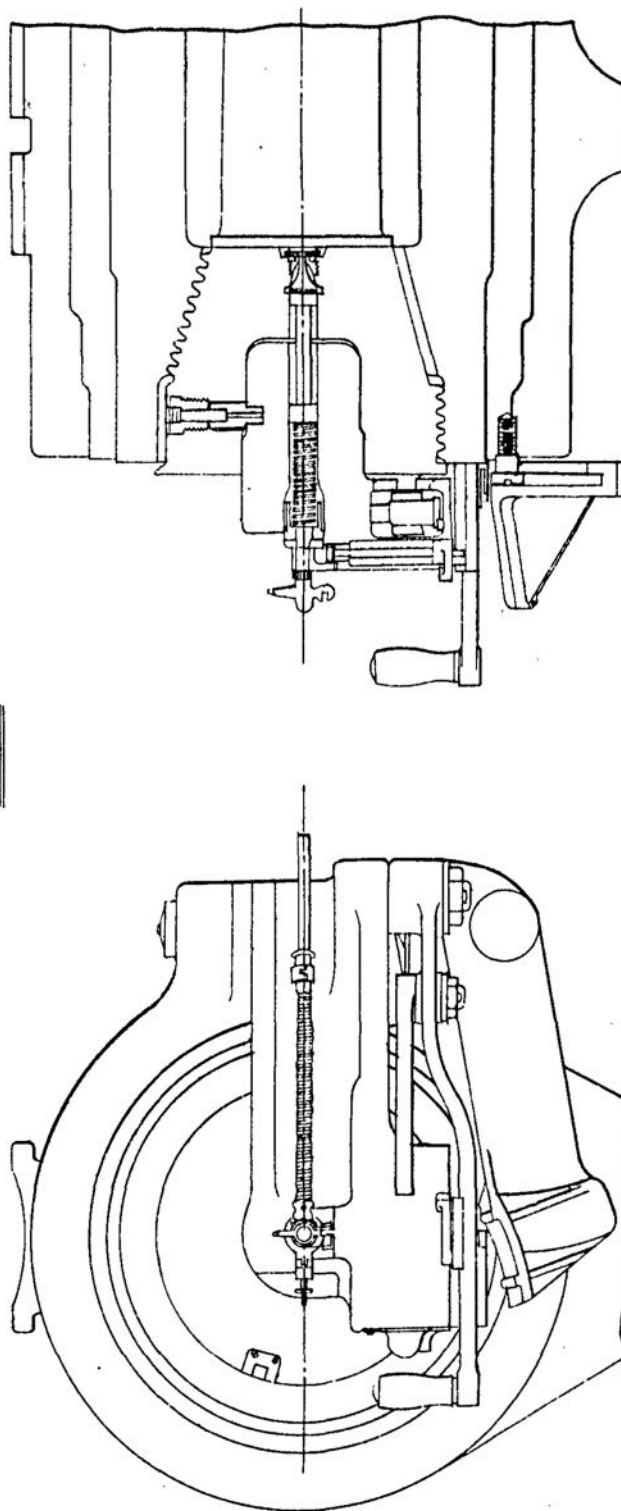
SCALE $\frac{3}{32}$



SECTION OF GROOVE
NO OF GROOVES 12.
FULL SIZE.

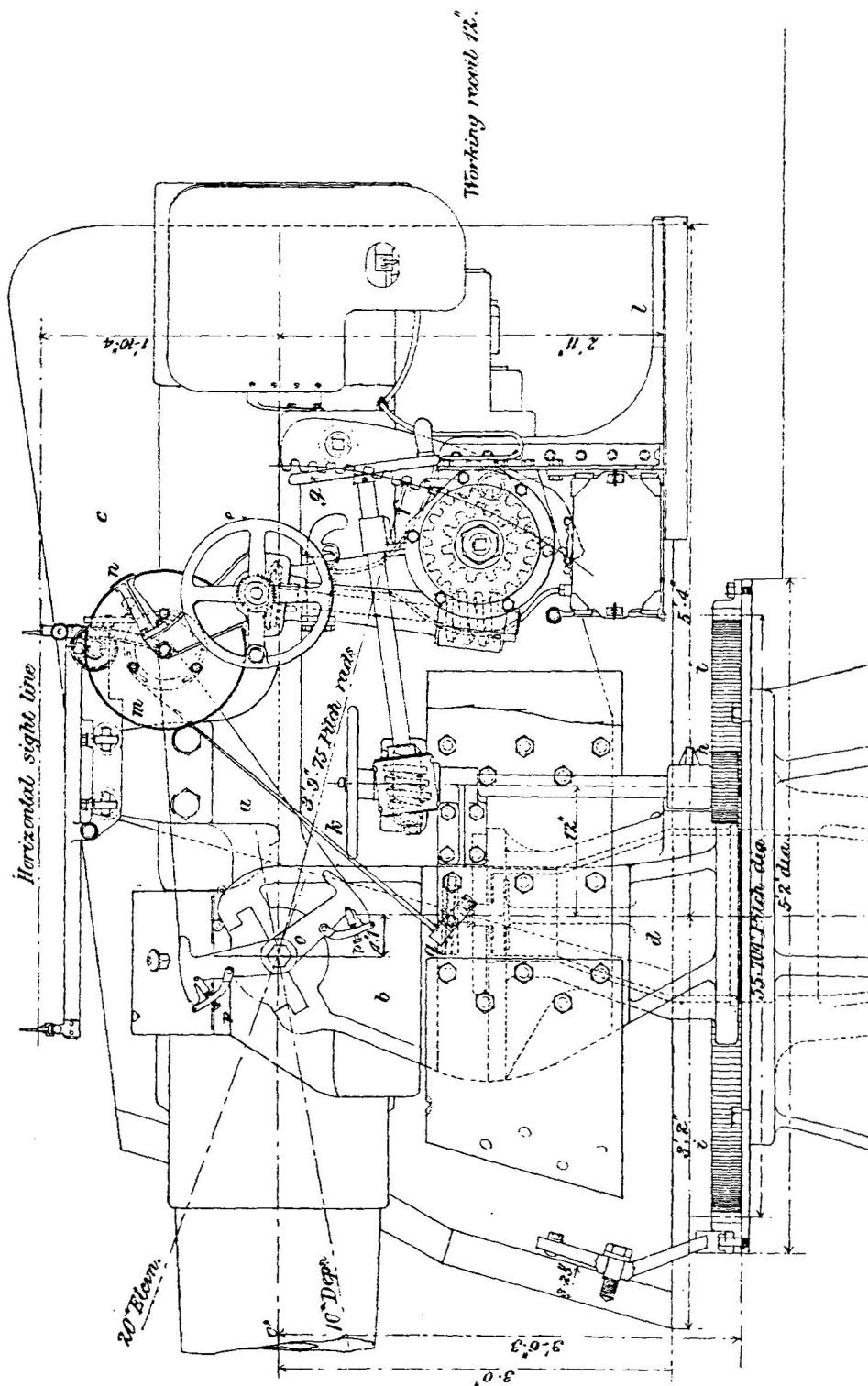
ORDNANCE Q. F. 6 INCH B.
ARRANGEMENT OF BREECH MECHANISM.

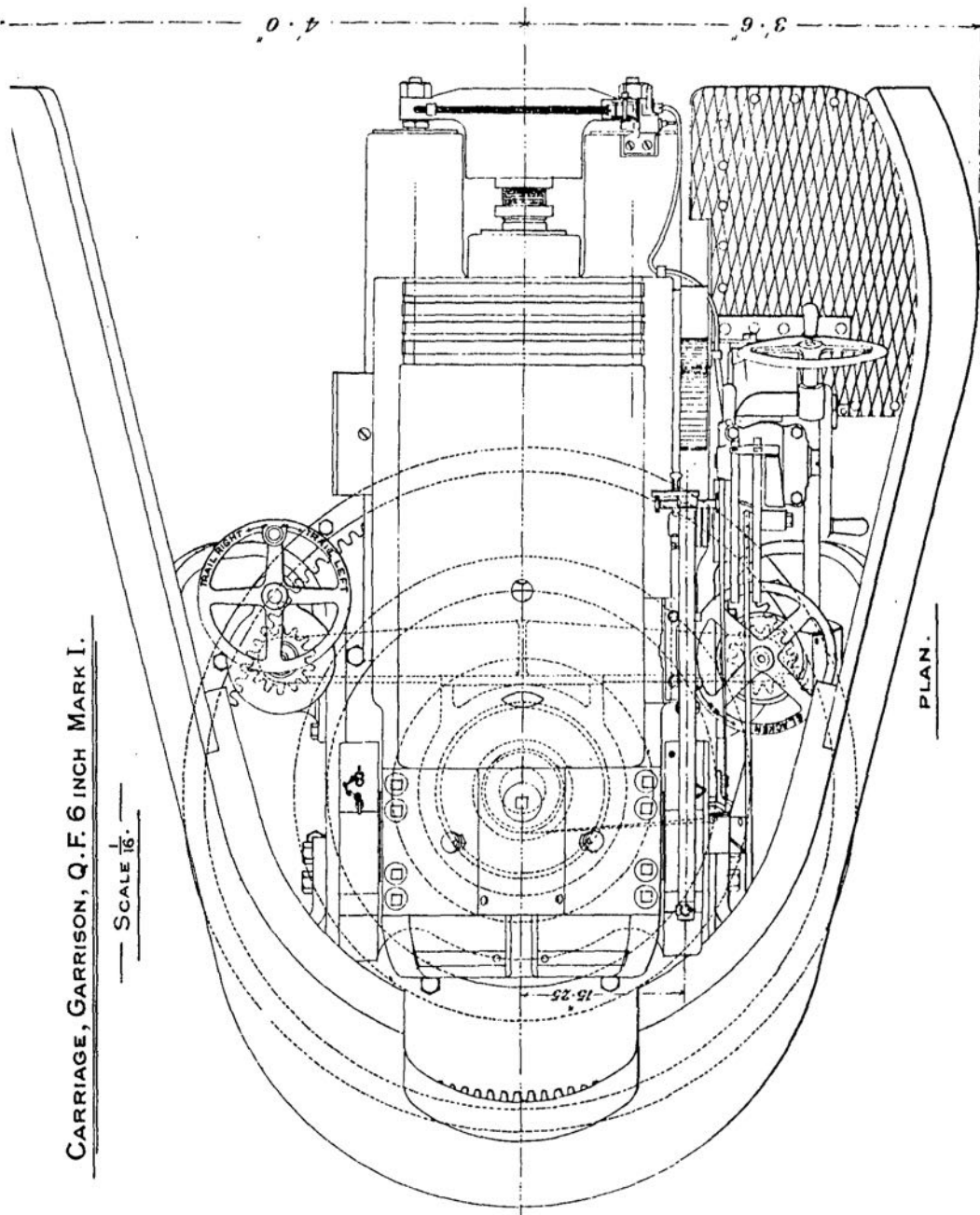
SCALE $\frac{1}{8}$ IN.



CARRIAGE, GARRISON, Q. F. 6 INCH. MARK I.

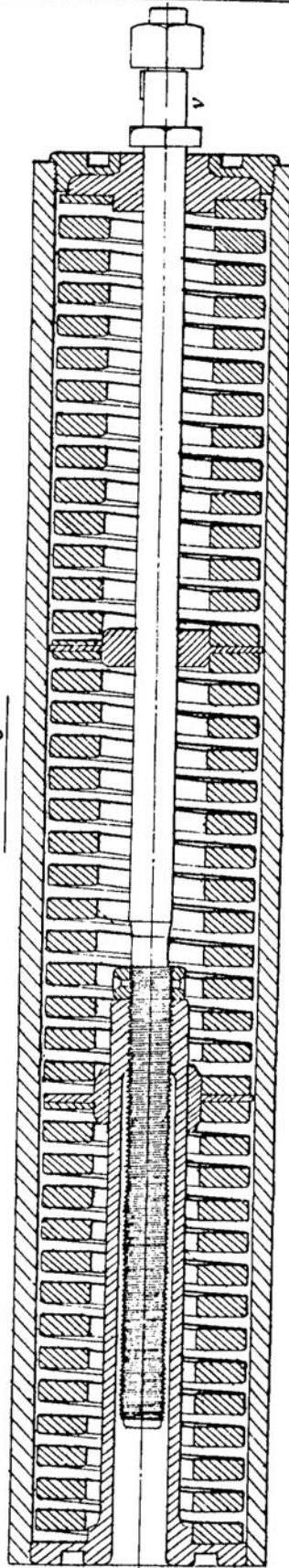
SCALE $\frac{1}{16}$



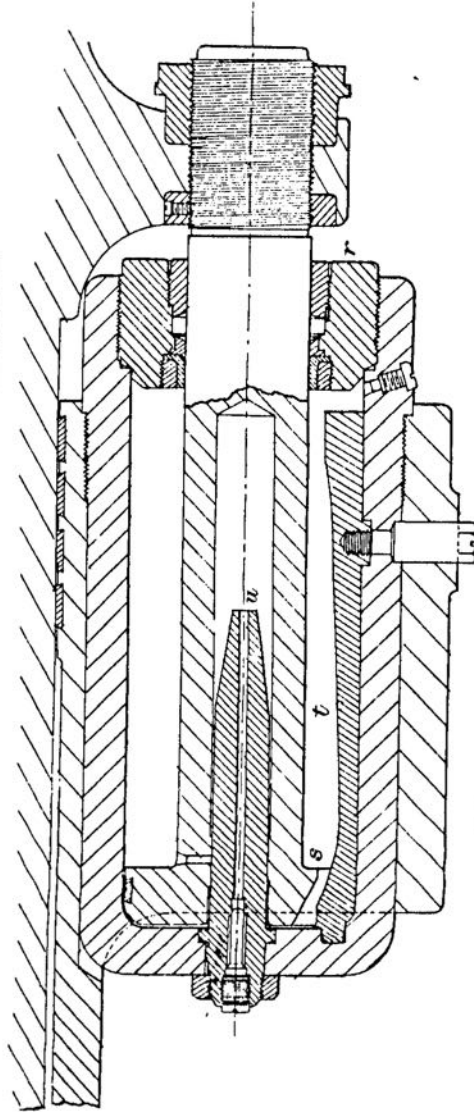


CARRIAGE, GARRISON, Q.F. 6 INCH MARK I.

SCALE $\frac{1}{6}$ "



SECTIONAL ELEVATION OF SPRING CASE.

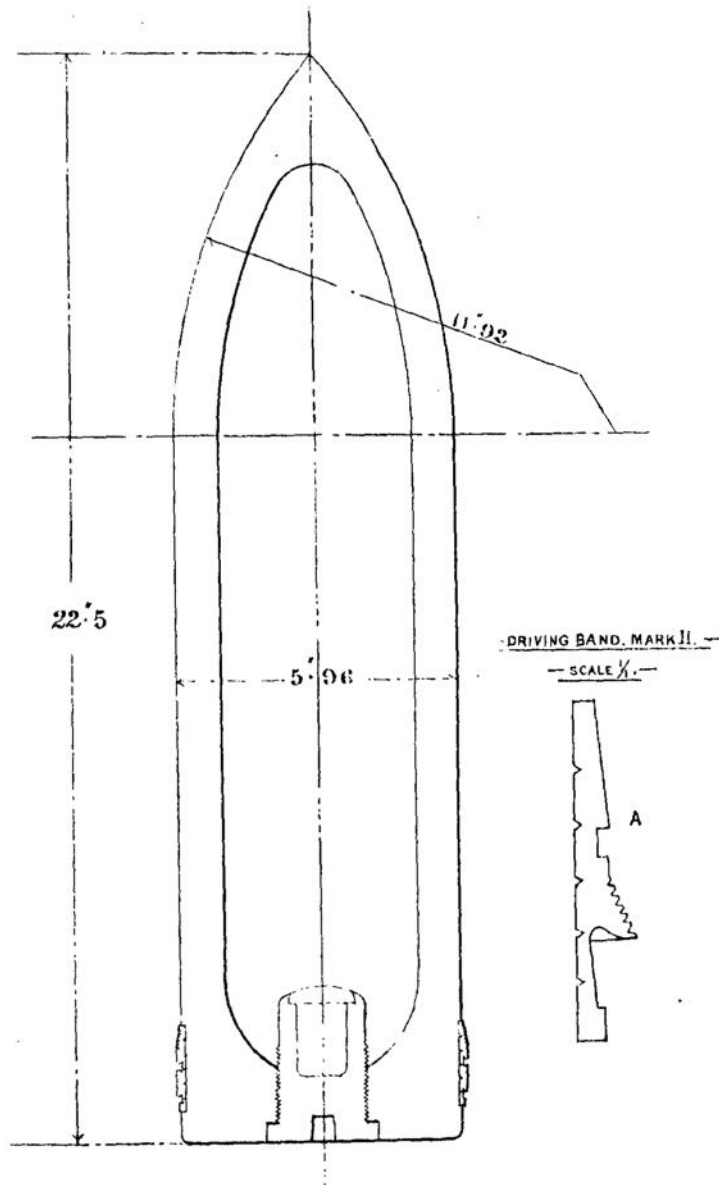


SECTIONAL ELEVATION OF BUFFER

SHELL, B.L. Q.F. OR Q.F.C., COMMON POINTED, 6 INCH. MARK I.

CAST STEEL.

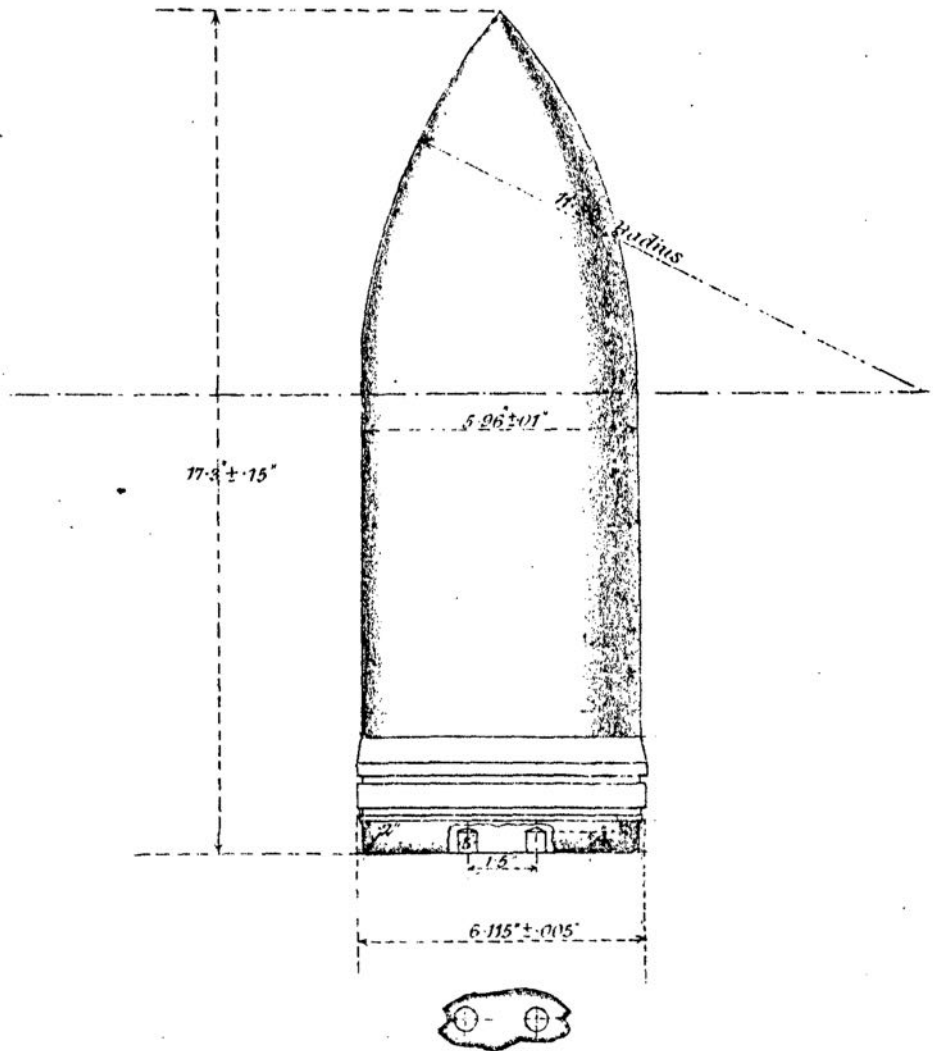
— SCALE $\frac{1}{4}$. —



SHOT, B.L.Q.F. OR Q.F.C., ARMOUR PIERCING, 6 INCH. MARK I.

STEEL.

SCALE $\frac{1}{4}$.

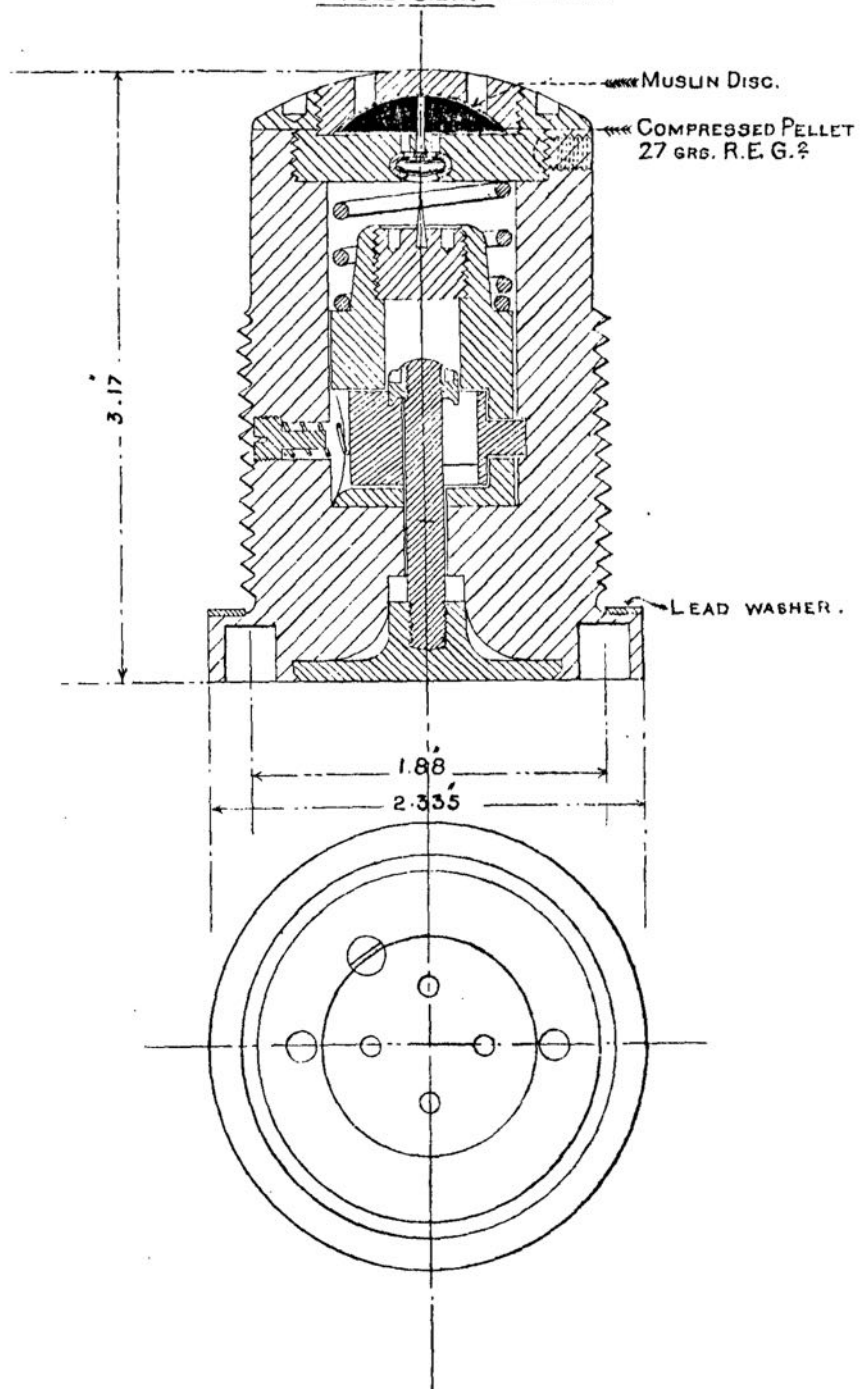


PART PLAN OF BASE

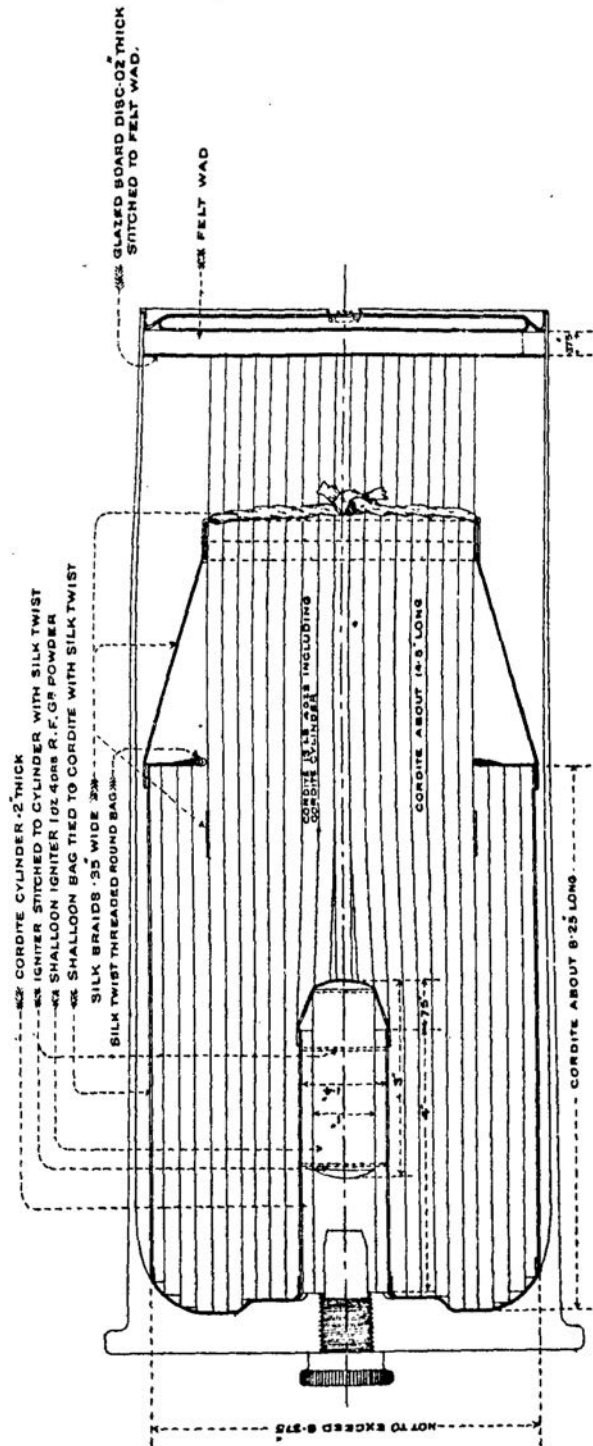
FUZE, PERCUSSION, BASE, LARGE, N° II MARK I.

METAL: ONE IN A TIN CYLINDER.

FULL SIZE.



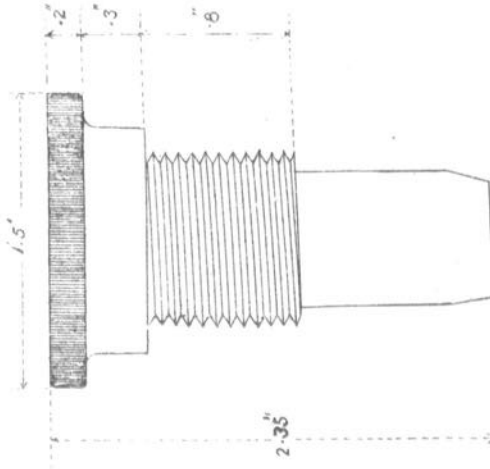
SCALE 1/3.



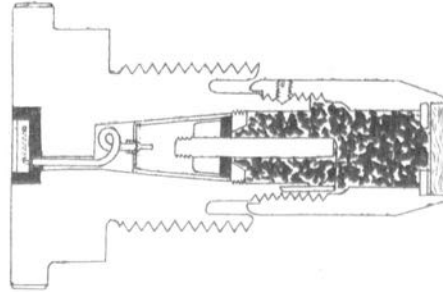
PRIMER, ELECTRIC, LARGE. MARKS III AND IV.

Scale $\frac{1}{16}$.

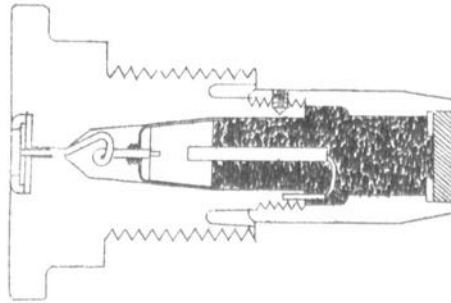
Marks III & IV.
Elevation.



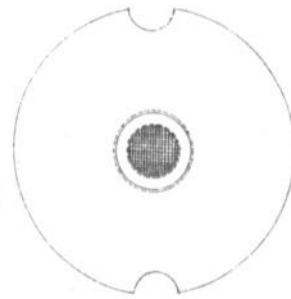
Mark IV
Section.



Mark III
Section.



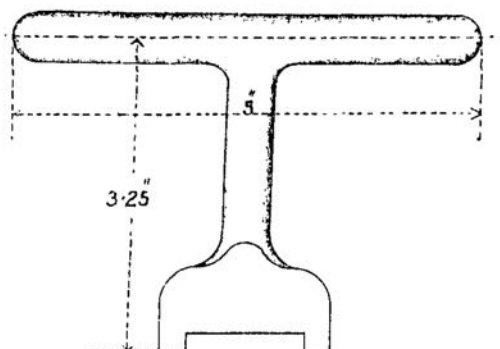
Plan.



KEY, INSERTING, PRIMER, ELECTRIC, Q. F. OR Q. F. C, LARGE. MARK I.

STEEL.

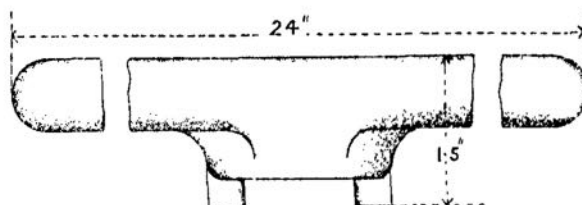
SCALE 1/2.



KEY, REMOVING, PRIMER, ELECTRIC, Q. F. OR Q. F. C, LARGE. MARK I.

STEEL.

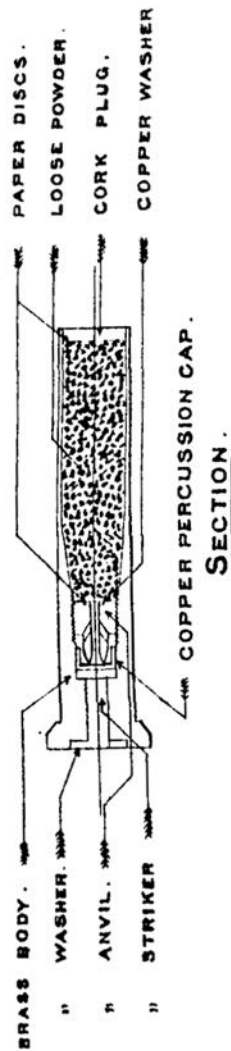
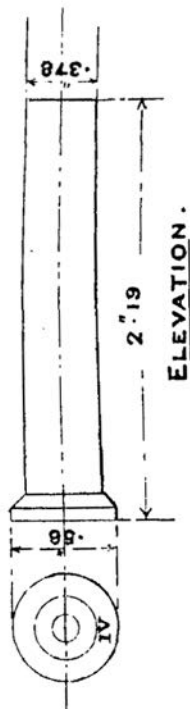
SCALE 1/2.



TUBE, VENT-SEALING, PERCUSSION, MARK IV.

BRASS.

FULL SIZE.



TUBE, VENT SEALING, PERCUSSION, DRILL. MARK I.

SECTION.
FULL SIZE.

